CLAIMS

1. A method for irradiating a target, comprising the steps of:
establishing a relationship of at least one marker relative to the target;
generating an image signal of the least one marker;
generating a tracking signal in response to the image signal; and
adjusting a radiation beam in response to the tracking signal to track the target.

2. The method as claimed in claim 1, wherein:
the step of establishing a relationship of at least one marker relative to the target includes implanting the at least one marker in a patient undergoing a radiation treatment for a tumor;
the step of generating an image signal includes generating an X-ray image of the at least one marker; and
the step of generating a tracking signal includes generating the tracking signal to track a movement of the tumor.

3. The method as claimed in claim 1, wherein the step of generating an image signal includes generating the image signal regarding an anatomy of a patient having a tumor as the target.

4. The method as claimed in claim 1, wherein the step of generating an image signal further includes the steps of:
illuminating the target and an area near the target with a first image beam; and
detecting a first image of the at least one marker formed by the first image beam.

5. The method as claimed in claim 4, wherein the step of generating an image signal further includes the steps of:
illuminating the target and the area near the target with a second image beam unparallel to the first image beam; and
detecting a second image of the at least one marker formed by the second image beam.

6. The method as claimed in claim 1, wherein the step of adjusting a radiation beam further includes the steps of:
superimposing the tracking signal on a radiation treatment plan; and
generating a beam adjustment signal using the treatment plan with the tracking signal superimposed thereon.

7. The method as claimed in claim 1, wherein the step of adjusting a radiation beam further includes adjusting the radiation beam using a first multiple leaf collimator having a plurality of movable leaves arranged in two rows opposite to each other.

8. The method as claimed in claim 7, wherein the step of adjusting a radiation beam further includes adjusting the radiation beam using a second multiple leaf collimator having a plurality of movable leaves arranged in two rows opposite to each other and unparallel to the plurality of leaves of the first multiple leaf collimator.

9. The method as claimed in claim 7, wherein the step of adjusting a radiation beam further includes temporarily switching off the radiation beam in response to the tracking signal having a value indicating the target being outside an area.

10. A method for irradiating a target in an animal body, comprising the steps of:
establishing a relationship of at least one marker relative to the target, the at least one marker being placed internally in the animal body;
generating an image signal of the least one marker;
generating a tracking signal in response to the image signal; and
adjusting a radiation beam in response to the tracking signal to track the target.

11. An apparatus for irradiating a target, comprising:
a platform for supporting an object having a marker indicating a position of the target;
a radiation source, said radiation source generating a radiation beam toward said platform;
a beam adjuster between said radiation source and said platform;
a first image detector, said first image detector generating a first image signal of the marker; and
a control module coupled to said image detector and to said beam adjuster, said control module generating a beam adjustment signal for said beam adjuster in response to the first image signal.

12. The apparatus of claim 11, said control module being further coupled to said radiation source and generating a control signal to switching off said radiation source in response to the first image signal.

13. The apparatus of claim 11, said control module being further coupled to said platform and generating a control signal to move said platform in response to the first image signal.

14. The apparatus of claim 11, said first image detector including at least one device selected from a group of devices consisting of a video camera, an X-ray imager, a magnetic field detector, an ultrasound sensor, a computed tomography imager, a single photon emission computed tomography imager, a magnetic resonance imager, a magnetic resonance spectroscopy imager, and a positron emission tomography imager.

15. The apparatus of claim 11, further comprising a gantry, said gantry housing said radiation source and said beam adjuster.

16. The apparatus of claim 15, said control module being further coupled to said gantry and generating a control signal to move said gantry in response to the first image signal.

17. The apparatus of claim 11, further comprising a first image beam source generating a first image beam toward said platform, said first image detector generating the first image signal by detecting the first image beam.

18. The apparatus of claim 17, further comprising:
a second image beam source, said second image beam source generating a second image beam toward said platform and unparallel to the first image beam; and
a second image detector coupled to said control module, said second image detector generating a second image signal by detecting the second image beam.

19. The apparatus of claim 11, said beam adjuster including a first multiple leaf collimator comprised of a first row of movable leaves and a second row of movable leaves opposite to each other.

20. The apparatus of claim 19, said beam adjuster further including a second multiple leaf collimator between said first multiple leaf collimator and said platform and comprised of a plurality of movable leaves unparallel to said first row and said second row of movable leaves in said first multiple leaf collimator.

21. A radiation therapy process, comprising the steps of:
marking a tumor in a patient with at least one marker;
generating a first image signal of the least one marker;
generating a tracking signal in response to the first image signal to track a movement of the tumor; and
adjusting a first multiple leaf collimator in response to the tracking signal to adjust a radiation beam projected onto the patient.

22. The radiation therapy process of claim 21, the step of marking a tumor including implanting the at least one marker into the patient.

23. The radiation therapy process of claim 21, the step of generating a first image signal including the steps of:
illuminating the tumor and an area near the tumor with a first image beam; and
detecting a first image of the at least one marker formed by the first image beam.

24. The radiation therapy process of claim 23, further comprising the steps of:
illuminating the tumor and the area near the tumor with a second image beam, the second image beam being unparallel to the first image beam;
detecting a second image of the at least one marker formed by the second image beam; and
generating a second image signal in response to the second image of the at least one marker.

25. The radiation therapy process of claim 21, the step of adjusting a radiation beam including the steps of:
superimposing the tracking signal on a radiation treatment plan for the tumor; and
generating a beam adjustment signal using the radiation treatment plan with the tracking signal superimposed thereon.

26. The radiation therapy process of claim 21, further comprising the step of moving a platform supporting the patient to reposition the patient in response to the tracking signal.

27. The radiation therapy process of claim 21, further comprising the step of moving a source generating the radiation beam to adjust a projection direction of the radiation beam onto the patient in response to the tracking signal.

28. The radiation therapy process of claim 21, further comprising the step of switching off the radiation beam in response to the tracking signal.

29. A process for irradiating a target in an animal body, comprising the steps of:
collecting a plurality of images at a plurality of phases in a cycle, said plurality of images providing an indication of a location of the target;
creating a treatment plan based at least in part on the plurality of images collected at the plurality of phases in the cycle; and
delivering a radiation beam to the animal body according to the treatment plan.

30. The process of claim 29, the step of collecting a plurality of images of the target including the steps of:
implanting at least one marker into the animal body; and
collecting a plurality of images of the at least one marker at the plurality of phases in the cycle.